International Renal Interest Society

IRIS Staging of CKD (modified 2013)

1. Staging of CKD (based on blood creatinine concentration)

Staging is undertaken following diagnosis of Chronic Kidney Disease (CKD) in order to facilitate appropriate treatment and monitoring of the patient. There are separate but related algorithms for staging CKD in cats and dogs.

Staging is based initially on fasting blood creatinine, assessed on at least two occasions in the stable patient. The patient is then substaged based on proteinuria and blood pressure.

Based on these categories, some empirical recommendations can be made about the type of treatment it would be logical to use for these cases. In addition, predictions based on clinical experience might be made about the likely response to treatment.

Stage	Blood creatinine µmol/l mg/dl		Comments
	Dogs	Cats	
At risk	<125 **<1.4**	<140 **<1.6**	History suggests the animal is at increased risk of developing CKD in the future because of a number of factors (e.g., exposure to nephrotoxic drugs, breed, high prevalence of infectious disease in the area, or old age).
1	<125 **<1.4**	<140 **<1.6**	Nonazotemic. Some other renal abnormality present (e.g., inadequate urinary concentrating ability without identifiable nonrenal cause, abnormal renal palpation or renal imaging findings, proteinuria of renal origin, abnormal renal biopsy results, increasing blood creatinine concentrations in samples collected serially).
2	125 – 180 **1.4 – 2.0**	140 – 250 **1.6 – 2.8**	Mild renal azotemia (lower end of the range lies within reference ranges for many laboratories, but the insensitivity of creatinine concentration as a screening test means that animals with creatinine values close to the upper reference limit often have excretory failure). Clinical signs usually mild or absent.
3	181 – 440 **2.1 – 5.0**	251 – 440 **2.9 – 5.0**	Moderate renal azotemia. Many extrarenal clinical signs may be present.
4	>440 **>5.0**	>440 **>5.0**	Increasing risk of systemic clinical signs and uraemic crises

Note these blood creatinine levels apply to average size dogs – those of extreme size may vary

2a. Substaging by Proteinuria

The goal is to identify renal proteinuria having ruled out post-renal and pre-renal causes.

Standard urine dipsticks can give rise to false positives therefore practitioners should consider using a more specific screening test such as the sulphosalicylic acid turbidometric test or the ERD® test.

The urine protein to creatinine (UP/C) ratio should be measured in all cases, provided there is no evidence of urinary tract inflammation or hemorrhage and the routine measurement of plasma proteins has ruled out dysproteinemias. Ideally staging should be done on the basis of at least three urine samples collected over a period of at least 2 weeks.

UP/C value		**Substage**
Dogs	Cats	
<0.2	<0.2	Non-proteinuric
0.2 to 0.5	0.2 to 0.4	Borderline proteinuric (BP)
>0.5	>0.4	Proteinuric (P)

Patients with persistent proteinuria in the BP subcategory should be re-evaluated within 2 months and re-classified as appropriate.

UP/Cs in the NP or BP range may be categorized as 'microalbuminuric' on the ERD® test. The significance of microalbuminuria in predicting future renal health is not understood at present. IRIS recommendation is to continue to monitor this level of proteinuria.

Proteinuria may decline as renal dysfunction worsens and so may be less frequent in animals in Stages 3 and 4.

Response to any treatment given to reduce glomerular hypertension, filtration pressure, and proteinuria, should be monitored at intervals using the UP/C ratio.

2b. Substaging by Arterial Blood Pressure

Patients should be acclimatized to the measurement conditions and multiple measurements taken. The final classification should rely upon multiple pressure determinations (preferably multiple patient visits to the clinic on separate days but acceptable if during the same visit with at least 2 hours separating determinations).

Patients are substaged by blood pressure according to the degree of risk of target-organ damage, and whether there is evidence of target-organ damage or complications.

Systolic BP mm Hg	Diastolic BP mm Hg	Adaptation when breed-specific reference range is available*	Arterial Pressure Substage (AP)
<150	<95	<10 mm Hg above reference range	**0** Minimal Risk
150 – 159	95 – 99	10 – 20 mm Hg above reference range	**1** Low Risk
160 – 179	100 – 119	20 – 40 mm Hg above reference range	**2** Moderate Risk
≥ 180	≥ 120	≥40 mm Hg above reference range	**3** High Risk
No evidence of target-organ damage/complications			**No complications (nc)**
Evidence of target-organ damage/complications			**Complications (c)**
Blood pressure not measured			**Risk not determined (RND)**
Treated			**T**

As with proteinuria, in the absence of evidence of target-organ damage, demonstration of persistence of blood pressure readings within a particular category is important.

'Persistence' of elevation should be judged on multiple blood pressure measurements made over the following timescales:

- 2 months (if at moderate risk – 160 to 179 mm Hg systolic BP)
- 1 to 2 weeks (if at severe risk – ≥180 mm Hg).

*If available, it is preferable to use breed specific ranges for normal values and compare the measurement to the upper limit of the normal range for the breed being evaluated. Sight hounds, in particular, have a higher reference range than most breeds of dog.

3. Therapy Effect

If antihypertensive/antiproteinuric therapy is instigated, subsequent staging of hypertension/proteinuria should be based on the current values for blood pressure and UP/C.

Example:

Cat A before treatment

Creatine 260 µmol/l
UP/C 0.3
Systolic blood pressure 200 mm Hg
IRIS CKD Stage 3-BP-AP3

Cat A after antihypertensive treatment

Creatine 300 µmol/l
UP/C 0.3
Systolic blood pressure 155 mm Hg
IRIS CKD Stage 3-BP-AP1 (T)

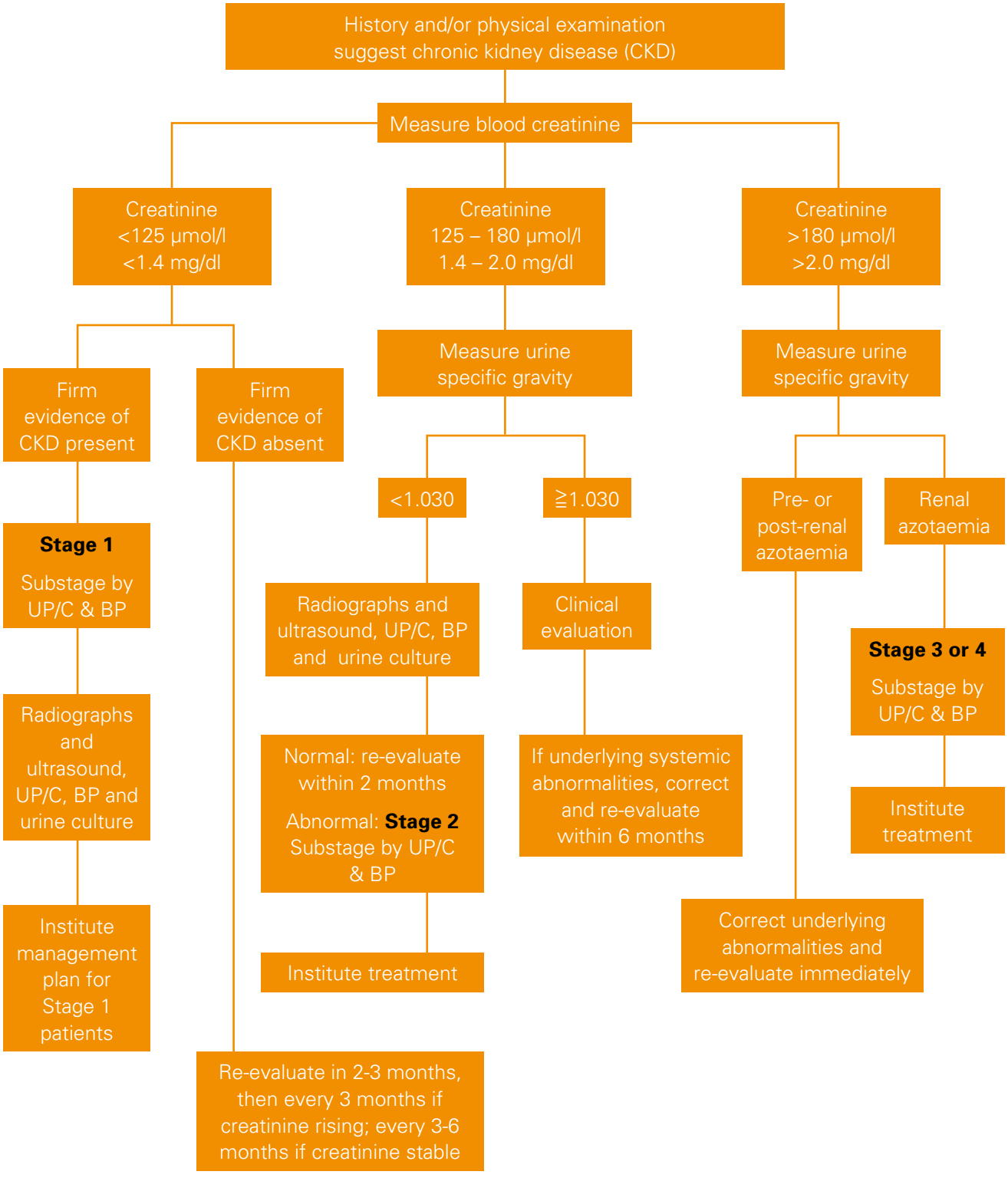
Dog B before treatment

Creatine 160 µmol/l
UP/C 0.8
Systolic blood pressure 155 mm Hg
IRIS CKD Stage 2-P-AP1

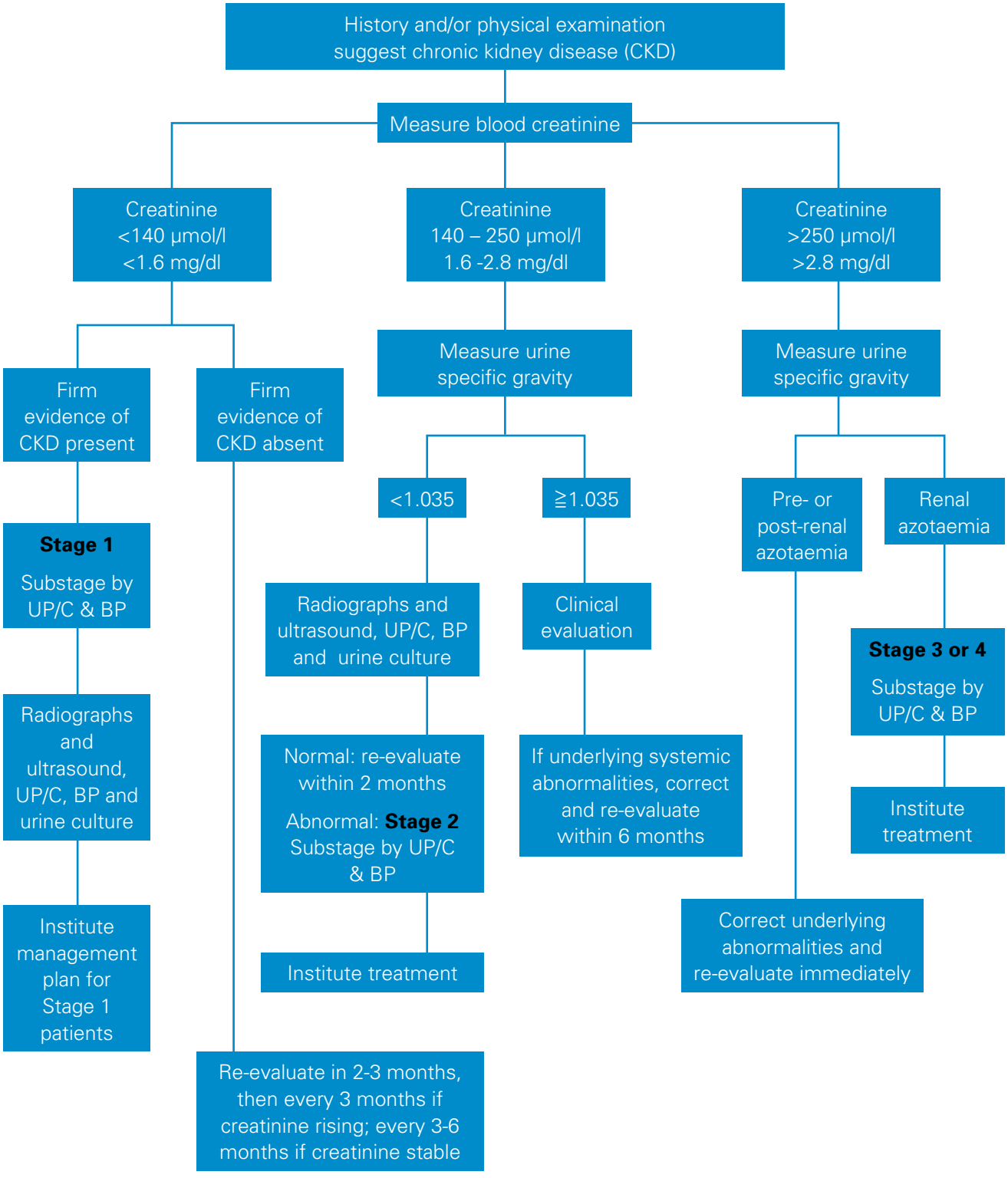
Dog B after antiproteinuric treatment

Creatine 170 µmol/l
UP/C 0.4
Systolic blood pressure 155 mm Hg
IRIS CKD Stage 2-BP (T)-AP1

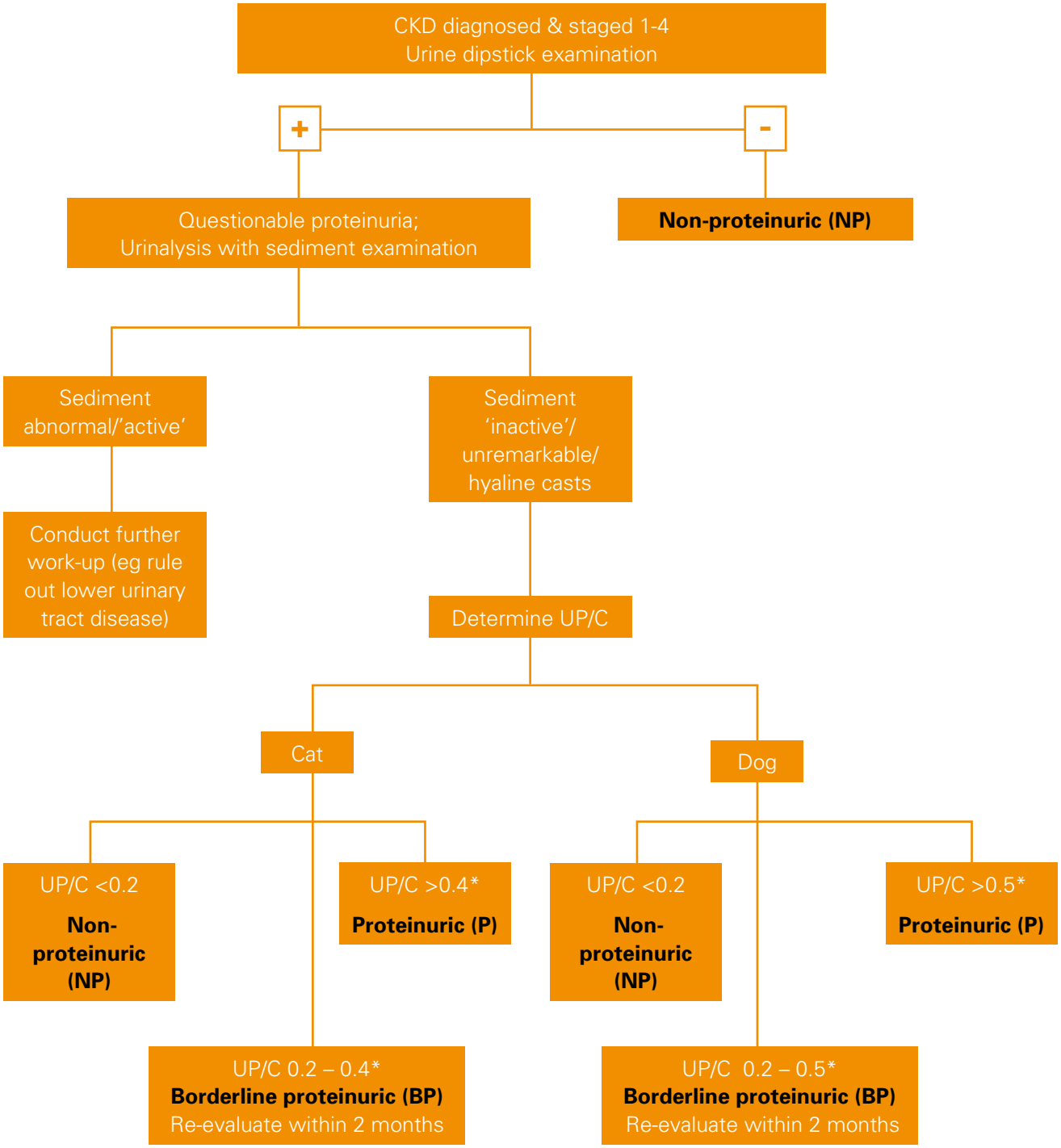
Algorithm for Staging of Chronic Kidney Disease in Dogs


History and/or physical examination suggest chronic kidney disease (CKD)
Measure blood creatinine
Creatinine <125 µmol/l <1.4 mg/dl
Creatinine 125 – 180 µmol/l 1.4 – 2.0 mg/dl
Creatinine >180 µmol/l >2.0 mg/dl
Measure urine specific gravity
Measure urine specific gravity
Firm evidence of CKD present
Firm evidence of CKD absent
<1.030
≧1.030
Pre- or post-renal azotaemia
Renal azotaemia
Stage 1
Substage by UP/C & BP
Radiographs and ultrasound, UP/C, BP and urine culture
Radiographs and ultrasound, UP/C, BP and urine culture
Clinical evaluation
Stage 3 or 4
Substage by UP/C & BP
Institute management plan for Stage 1 patients
Normal: re-evaluate within 2 months
Abnormal: Stage 2 Substage by UP/C & BP
If underlying systemic abnormalities, correct and re-evaluate within 6 months
Institute treatment
Institute treatment
Correct underlying abnormalities and re-evaluate immediately
Re-evaluate in 2-3 months, then every 3 months if creatinine rising; every 3-6 months if creatinine stable

Algorithm for Staging of Chronic Kidney Disease in Cats


History and/or physical examination suggest chronic kidney disease (CKD)
Measure blood creatinine
Creatinine <140 µmol/l <1.6 mg/dl
Creatinine 140 – 250 µmol/l 1.6 -2.8 mg/dl
Creatinine >250 µmol/l >2.8 mg/dl
Firm evidence of CKD present
Firm evidence of CKD absent
Measure urine specific gravity
Measure urine specific gravity
Stage 1
Substage by UP/C & BP
Radiographs and ultrasound, UP/C, BP and urine culture
Institute management plan for Stage 1 patients
Re-evaluate in 2-3 months, then every 3 months if creatinine rising; every 3-6 months if creatinine stable
<1.035
≧1.035
Pre- or post-renal azotaemia
Renal azotaemia
Radiographs and ultrasound, UP/C, BP and urine culture
Clinical evaluation
Normal: re-evaluate within 2 months
Abnormal: Stage 2 Substage by UP/C & BP
Institute treatment
If underlying systemic abnormalities, correct and re-evaluate within 6 months
Stage 3 or 4
Substage by UP/C & BP
Institute treatment
Correct underlying abnormalities and re-evaluate immediately

Algorithm for Substaging by Proteinuria



*demonstrate persistence by re-evaluating:
if Borderline Proteinuric, in 2 weeks to 2 months
if Proteinuric, in 2-4 weeks
if UP/C>2, no need to demonstrate persistence prior to initiating therapy (severe proteinuria)

Algorithm for Substaging by Blood Pressure (risk of target-organ damage from hypertension)